Impact of Patient Education on Physical Activity, Its Practices, and Self-Care Behaviour in Type 2 Diabetic Patients

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***Abstract*—Background: Type II Diabetes Mellitus (T2DM) is a global health crisis, with complications exacerbated by sedentary lifestyles, poor dietary habits, and inadequate self-care. Despite advances in medical care, the prevalence of T2DM continues to rise due to urbanization and unhealthy behaviors. Addressing this challenge requires targeted interventions, such as patient education, to enhance physical activity levels, self-care, and overall health outcomes.**

Objective: This study aimed to evaluate the effectiveness of patient education programs in improving knowledge about physical activity, self-care behaviors, and overall diabetes management among patients aged 40 years and above diagnosed with T2DM.

Methodology: A pre-post experimental design was employed, involving 128 participants from various community settings in Delhi-NCR. Patient education sessions focused on the importance of physical activity, self-care, and lifestyle modifications. Questionnaires, including the Global Physical Activity Questionnaire (GPAQ) and the Summary of Diabetes Self-Care Activities (SDSCA), were used to assess pre- and post-intervention outcomes. Statistical analysis involved paired t-tests.

Results: Significant improvements were observed post-intervention in physical activity knowledge, GPAQ scores across all domains (work, transport, recreation), and self-care behaviors ($p < 0.05$). These results underscore the critical role of patient education in diabetes management.

Conclusion: Patient education programs can significantly enhance physical activity levels, self-care behaviors, and knowledge among individuals with T2DM, contributing to better diabetes management and improved quality of life.

***Index Terms*—Type 2 diabetes, physical activity, patient education, self-care behaviors, diabetes management, GPAQ.**

I. INTRODUCTION

Type II Diabetes Mellitus (T2DM) represents a significant and growing public health burden worldwide, currently affecting approximately 463 million adults, according to the International Diabetes Federation. India, in particular, is on the brink of becoming the global epicentre of diabetes, with projections indicating that the nation will house the largest diabetic population in the coming years. The prevalence of T2DM is closely linked to rapid urbanization, dietary transitions, and increasingly sedentary lifestyles, which are hallmarks of modern society. These factors not only contribute to the onset of diabetes but also exacerbate its progression and complications.

T2DM accounts for 90–95% of all diabetes cases and is associated with severe health complications that significantly impact quality of life. Chronic hyperglycaemia leads to a range of macrovascular and microvascular complications, including cardiovascular disease, neuropathy, retinopathy, nephropathy, and an elevated risk of amputations. In addition to physical health challenges, T2DM imposes psychological and socioeconomic burdens on individuals and healthcare systems alike.

Physical activity is widely recognized as a cornerstone of diabetes management. Regular exercise enhances insulin sensitivity, promotes glycemic control, reduces cardiovascular risk, and contributes to overall metabolic health. Despite these benefits, adherence to recommended physical activity levels remains suboptimal. Among the barriers identified, a lack of awareness and structured education about the role of exercise and self-care in diabetes management is

particularly prominent. Many patients are either unaware of how to incorporate physical activity into their daily routines or lack the motivation and resources to do so.

Patient education has emerged as a vital intervention for improving diabetes outcomes. Structured education programs that emphasize the importance of physical activity and self-care behaviors can empower individuals to take control of their health. Such programs not only provide knowledge but also foster the behavioral changes necessary for sustained improvements in health outcomes.

This study seeks to evaluate the impact of structured patient education programs on physical activity practices, self-care behaviors, and diabetes management knowledge among individuals with T2DM. By addressing the critical gap in patient education, this research aims to contribute evidence supporting the integration of education into routine diabetes care, ultimately enhancing patient outcomes and reducing the burden on healthcare systems.

II. MATERIALS AND METHODS

This study employed a pre-post experimental design to assess the impact of a structured education program on physical activity, self-care practices, and knowledge among individuals with Type II Diabetes Mellitus (T2DM). Ethical approval for the study was obtained from the Amar Jyoti Institutional Review Board (AJIRB-EC/10/2022), ensuring compliance with ethical research standards. All participants provided written informed consent before enrolment, affirming their voluntary participation and agreement to the use of their anonymized data for research purposes.

A total of 128 participants were recruited using convenience and snowball sampling methods. The inclusion criteria required participants to be aged 40 years or older, proficient in spoken English, and diagnosed with T2DM for at least one year. Exclusion criteria included pregnancy, uncontrolled hypertension, recent musculoskeletal injuries or surgeries, or any other conditions that could hinder physical activity. These criteria ensured a homogenous sample of individuals capable of engaging with the intervention and assessments.

The intervention consisted of a structured education program aimed at improving participants' understanding of T2DM, the importance of physical activity, self-care practices, and dietary modifications. The content was delivered through a combination of one-on-one consultations, group lectures, and printed educational materials to cater to different learning preferences. To ensure comprehension, a post-education quiz was administered. Participants scoring below 50% received re-education to reinforce key concepts and address knowledge gaps.

To evaluate the program's effectiveness, three validated tools were used as outcome measures. The Global Physical Activity Questionnaire (GPAQ) assessed physical activity levels across work, transport, and recreational domains. The Summary of Diabetes Self-Care Activities (SDSCA) measured adherence to self-care practices, including medication, diet, and blood glucose monitoring. Additionally, the Physical Activity Knowledge Questionnaire gauged improvements in participants' understanding of the role of physical activity in diabetes management.

Pre- and post-intervention data were collected and analysed using paired t-tests to determine the significance of changes across the assessed variables. The level of statistical significance was set at $p < 0.05$, ensuring that observed changes were unlikely due to chance. This comprehensive methodology aimed to provide robust evidence on the effectiveness of structured education programs in enhancing diabetes self-management.

III. RESULTS

The demographic characteristics of the study participants revealed a mean age of 54.52 ± 9.06 years, with 60 males and 68 females, highlighting a relatively balanced gender distribution. The mean body mass index (BMI) was 26.64 ± 4.71 kg/m². When categorized, 75% of participants fell within the normal weight range, while 18% were classified as obese, 5.5% as overweight, and 1.6% as underweight. These demographics provided a diverse sample representative of middle-aged and older adults with Type II Diabetes Mellitus (T2DM).

The intervention demonstrated significant improvements in physical activity levels, as measured by the Global Physical Activity Questionnaire (GPAQ). Post-intervention scores showed meaningful increases across all domains of physical activity. The mean score for work-related activity increased from 29.23 ± 36.66 to 35.92 ± 31.65 ($p < 0.05$), reflecting

greater engagement in occupational tasks requiring physical effort. Transportation-related activity scores also improved, with mean scores rising from 28.94 ± 33.77 to 38.14 ± 30.92 ($p < 0.05$), indicating an increased tendency to incorporate active modes of commuting, such as walking or cycling. Recreational activity saw the most substantial relative increase, with mean scores improving from 8.79 ± 19.66 to 15.66 ± 19.67 ($p < 0.05$), suggesting heightened participation in leisure-time physical activities.

Self-care behaviors, as evaluated by the Summary of Diabetes Self-Care Activities (SDSCA) questionnaire, also improved significantly following the education program. The mean SDSCA score increased from 15.43 ± 5.72 to 22.72 ± 3.85 ($p < 0.05$), reflecting better adherence to self-care practices such as medication intake, dietary management, blood glucose monitoring, and physical activity.

In addition to physical activity and self-care, participants exhibited notable improvements in their knowledge about diabetes management. The mean knowledge score, assessed via the Physical Activity Knowledge Questionnaire, increased significantly from 14.70 ± 2.49 before the intervention to 17.54 ± 1.88 afterward ($p < 0.05$). This finding underscores the effectiveness of the structured education program in enhancing participants' understanding of the critical role of physical activity and self-care in managing T2DM.

Overall, the results highlight the substantial impact of the educational intervention on improving physical activity, self-care behaviors, and knowledge among individuals with T2DM, demonstrating the potential for structured programs to promote healthier lifestyles and better disease management outcomes.

IV. DISCUSSION

This study underscores the transformative role of structured patient education in managing Type II Diabetes Mellitus (T2DM). The significant improvements observed in participants' physical activity levels, self-care behaviors, and diabetes management knowledge highlight the essential role that educational interventions play in enhancing patient outcomes. Educating patients about their condition, specifically regarding the importance of physical activity and self-care, empowers them to make informed decisions that improve their overall health. The results suggest that patient education programs can substantially enhance lifestyle modifications, ultimately improving long-term diabetes management and reducing complications associated with T2DM.

The findings of this study align closely with previous research that emphasizes the impact of patient education on chronic disease management, particularly T2DM. Studies consistently show that patient education is a crucial factor in promoting adherence to treatment protocols, increasing physical activity, and improving self-management behaviors. For instance, similar studies have reported that when patients understand the benefits of physical activity in managing their diabetes, they are more likely to adopt regular exercise routines and follow prescribed self-care behaviors. In particular, interventions that combine education with practical strategies, such as incorporating exercise into daily activities or offering dietary advice, have been shown to lead to improved clinical outcomes. This study's results, which reflect a significant increase in physical activity adherence and self-care practices, support these findings and demonstrate that structured educational programs can effectively encourage individuals to take an active role in managing their diabetes.

One of the key strengths of this study lies in the use of validated, reliable tools such as the Global Physical Activity Questionnaire (GPAQ) and the Summary of Diabetes Self-Care Activities (SDSCA). These instruments have been extensively used in diabetes research to assess physical activity and self-care behaviors, ensuring the reliability of the data collected. Furthermore, the focus on middle-aged and older adults, a high-risk demographic for T2DM, enhances the relevance and applicability of the findings. As this group is particularly susceptible to the complications of diabetes, effective interventions aimed at improving self-management are critical. The study's focus on this age group makes the results particularly valuable for healthcare providers working with this population.

V. LIMITATIONS

However, the study is not without its limitations. One significant limitation is the relatively small sample size, which may restrict the generalizability of the findings. Although the results are promising, a larger sample would provide more robust data and increase

confidence in the applicability of the findings to the broader population. Additionally, the study lacked a control group, which limits the ability to establish a causal relationship between the educational intervention and the observed improvements in physical activity and self-care behaviors. Without a control group, it is difficult to determine whether the positive outcomes were solely attributable to the intervention or if other factors may have played a role. Another limitation is that the study was conducted in urban settings, which may not fully represent the experiences of individuals in rural areas. In rural populations, access to healthcare, educational resources, and opportunities for physical activity may differ, potentially influencing the effectiveness of similar educational programs in those regions.

Future research should address these limitations by conducting randomized controlled trials (RCTs) with larger, more diverse samples. RCTs are the gold standard for establishing causality and would provide stronger evidence for the effectiveness of patient education programs in improving diabetes management. Additionally, future studies could explore the use of technology, such as mobile applications or telehealth platforms, to enhance the delivery of educational interventions. Technological advancements could offer a scalable and flexible

Tables and graphs

approach to diabetes education, particularly in remote or underserved areas where face-to-face education may be limited. Using technology, such as providing ongoing support via digital platforms, could increase patient engagement and adherence to educational content, thus promoting sustained lifestyle changes.

V. CONCLUSION

In conclusion, structured patient education plays a vital role in improving physical activity levels, self-care behaviors, and overall diabetes management in individuals with Type II Diabetes Mellitus. The significant improvements observed in this study demonstrate that integrating educational interventions into routine diabetes care is essential for enhancing patient outcomes. By empowering individuals with knowledge and practical strategies, healthcare providers can help patients manage their diabetes more effectively, ultimately improving quality of life and reducing the long-term burden on healthcare systems. This study supports the inclusion of educational programs as a core component of diabetes management and highlights the need for further research to refine and expand these programs to reach a wider population.

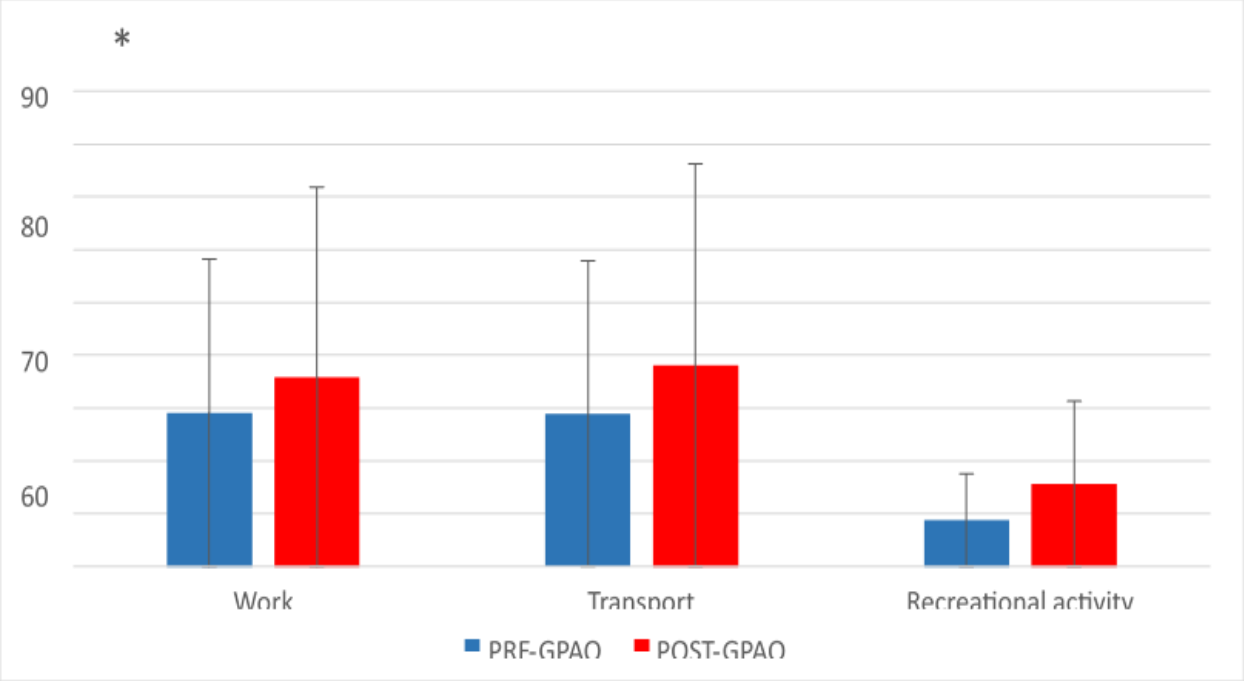

Figure 1: *Mean and SD of components and total GPAQ*

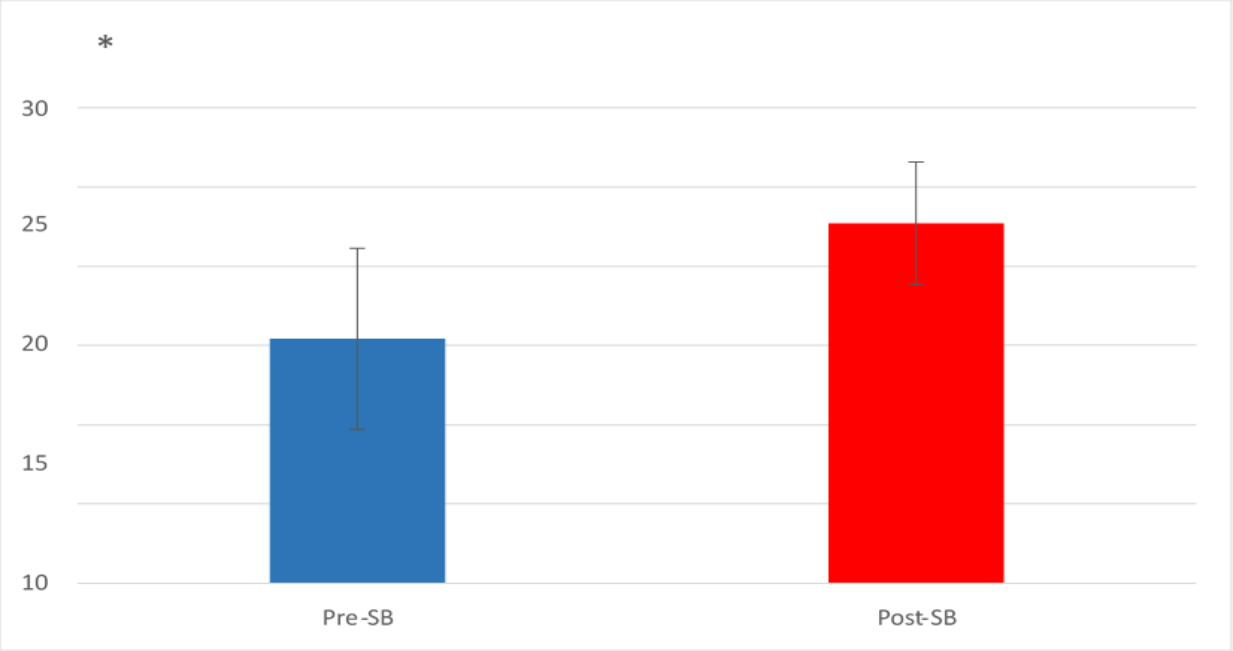

Figure 2: *Mean and SD of Self-care behavior*

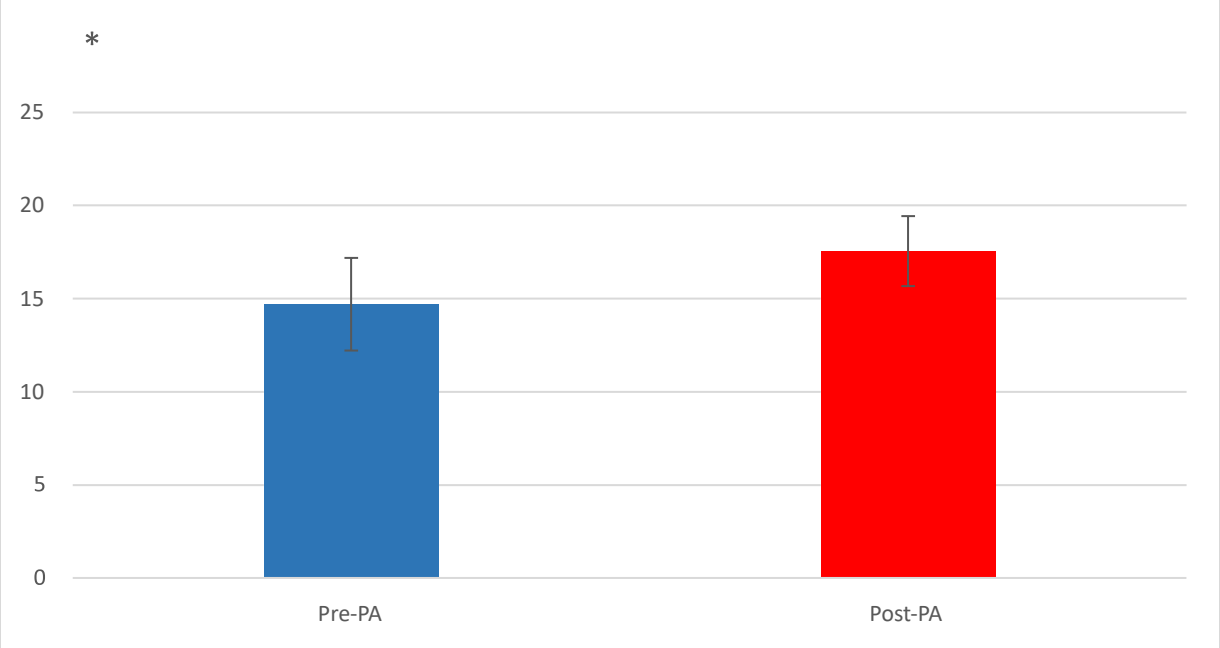

Figure 3: *Graphical representation of Mean and SD of Physical Activity Knowledge*

REFERENCES

[1] Anjana RM, Deepa M, Pradeepa R, Mahanta J, Narain K, Das HK, Adhikari P, Rao PV, Saboo B, Kumar A, Bhansali A. Prevalence of diabetes and prediabetes in 15 states of India: results from the ICMR–INDIAB population-based cross-sectional study. The lancet Diabetes & endocrinology. 2017 Aug 1;5(8):585-96.

[2] American Diabetes Association. (2022). Introduction: Standards of medical care in diabetes— 2022.Diabetes care, 45(Supplement_1), S1-S2.

[3] Pradeepa R, Mohan V. Epidemiology of type 2 diabetes in India. Indian journal of ophthalmology. 2021 Nov 1;69(11):2932-8.

[4] Raghuram N, Ram V, Majumdar V, Sk R, Singh A, Patil S, Anand A, Judu I, Bhaskara S, Basa JR, Nagendra HR. Effectiveness of a Yoga-Based Lifestyle Protocol (YLP) in preventing diabetes in a high-risk Indian cohort: a multicenter cluster-randomized controlled trial (NMB-Trial). Frontiers in Endocrinology. 2021 Jun 11; 12:664657.

[5] Buysschaert M, Hermans MP. Non-pharmacological management of type 2 diabetes. Acta Clinica Belgica. 2004 Jan 1;59(1):14-9.

[6] Sanghamitra P, Eunice L, Sandipana P, Shayma D, Pranab M. Type 2 diabetes and physical activity: barriers and enablers to diabetes control in Eastern India. Primary Health Care Research & Development. 2019 Jan;20: e44.

[7] Holt RI, DeVries JH, Hess-Fischl A, Hirsch IB, Kirkman MS, Klupa T, Ludwig B, Nørgaard K, Pettus J, Renard E, Skyler JS. The management of type 1 diabetes in adults. A consensus report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). Diabetes care. 2021 Nov 1;44(11):2589-625.

[8] Boyle JP, Thompson TJ, Gregg EW, Barker LE, Williamson DF. Projection of the year 2050 burden of diabetes in the US adult population: dynamic modeling of incidence, mortality, and prediabetes prevalence. Population health metrics. 2010 Dec; 8:1-2.

[9] Bull FC, Al-Ansari SS, Biddle S, Borodulin K, Buman MP, Cardon G, Carty C, Chaput JP, Chastin S, Chou R, Dempsey PC. World Health Organization 2020 guidelines on physical activity and sedentary behaviour. British journal of sports medicine. 2020 Dec 1;54(24):1451-62.

[10] Shrestha N, Kukkonen-Harjula KT, Verbeek JH, Ijaz S, Hermans V, Pedisic Z. Workplace interventions for reducing sitting at work. Cochrane Database of Systematic Reviews. 2018(6).

[11] American Association of Diabetes Educators. An effective model of diabetes care and education: revising the AADE7 Self-Care Behaviors®. The Diabetes Educator. 2020 Apr;46(2):139-60.

[12] Palermi S, Iacono O, Sirico F, Modestino M, Ruosi C, Spera R, De Luca M. The complex relationship between physical activity and diabetes: an overview. Journal of Basic and Clinical Physiology and Pharmacology. 2022 Sep 26;33(5):535-47.

[13] Silva-Tinoco R, Cuatecontzi-Xochitiotzi T, De la Torre-Saldaña V, León-García E, Serna-Alvarado J, Orea-Tejeda A, Castillo-Martínez L, Gay JG, Cantú-de-León D, Prada D. Influence of social determinants, diabetes knowledge, health behaviors, and glycemic control in type 2 diabetes: an analysis from real-world evidence. BMC endocrine disorders. 2020 Dec; 20:1-1.